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FM 4-119

WAR DEPARTMENT

**ANTIAIRCRAFT ARTILLERY
FIELD MANUAL**



EXAMINATION FOR GUNNERS

9 December 1943

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FIELD MANUAL**



**EXAMINATION FOR
GUNNERS**



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ANTIAIRCRAFT ARTILLERY FIELD MANUAL

EXAMINATION FOR GUNNERS

This manual supersedes so much of FM 4-150, 20 May 1941, as pertains to antiaircraft artillery.

CHAPTER 1

GENERAL

■ 1. OBJECT OF EXAMINATION.—The object of this examination is to determine specially qualified personnel in the use of their principal arm as indicated in AR 775-10; to furnish a basis for their classification as gunners; and to encourage cadets of the United States Military Academy, members of R. O. T. C. units, C. M. T. C. trainees, and personnel of the National Guard, by giving them an opportunity to qualify as gunners.

■ 2. CLASSIFICATION OF GUNNERS.—Gunnery will be divided into three classes: expert, first-class, and second-class. Classification depends upon the scope of the examination and the percentage obtained. The scope of the examination will be hereinafter stated. The qualifying mark for classification as second-class gunner will be not less than an average of 75 percent; for first-class gunner, not less than an average of 85 percent; and for expert gunner, not less than an average of 90 percent.

■ 3. SPECIALTY OF GUNNERS.—Gunnery, irrespective of classification, fall into one of the following specialties: AA guns, AA automatic weapons, AA searchlights, or AA headquarters.

■ 4. ELIGIBILITY OF CANDIDATES.—Any individual in any component of the Army of the United States, whose battery or detachment commander certifies that he has received the proper course of instruction and is otherwise eligible to go before the examining board, is eligible to take the examina-

tion for qualification. Candidates for first-class gunner must have previously qualified as second-class gunner of the same specialty and, similarly, candidates for expert gunner must have previously qualified as first-class gunner of the same specialty.

■ 5. REQUALIFICATION.—*a.* Officers and warrant officers may retain their qualification until reexamination.

b. Enlisted men having qualified as expert or first-class gunner may, during periods when additional compensation for qualification in arms is authorized, retain that classification until the expiration of 18 months or until reexamination, whichever comes first. In order to carry the retained rating to a new enlistment, a qualified enlisted man must reenlist in the same unit within 20 days from date of discharge, such reenlistment being within 18 months of date of qualification. During periods when additional compensation for qualification in arms is not authorized, enlisted men having qualified as expert or first-class gunner may elect to retain that classification as such during the current enlistment without requalification.

c. An enlisted man holding rating as second-class gunner will not be required to requalify in the same specialty as such during his current enlistment. Nothing in this manual will be construed to mean that the enlisted man will not be required to requalify in a different specialty whenever his primary weapon is changed.

d. An enlisted man holding a rating as expert or first-class gunner is not required to requalify in a lower rating of the same specialty.

e. A U. S. M. A. cadet, R. O. T. C. member, or C. M. T. C. trainee having qualified as expert or first-class gunner may retain that classification only until he becomes an officer, warrant officer, or enlisted man of the AAA of the AUS and has an opportunity to requalify.

■ 6. ADDITIONAL COMPENSATION.—For regulations pertaining to additional compensation for enlisted men for special qualifications, see AR 35-2380. Only personnel assigned to AAA units are eligible for additional compensation for qualification in arms under the provisions of this manual.

■ 7. BADGES.—For information as to gunners' badges, see AR 600-35, 600-40, and 600-75.

■ 8. INSTRUCTION OF CANDIDATES.—Prior to examination for gunners and in preparation therefore, unit commanders will insure that, so far as practicable, all candidates of their commands are properly and adequately trained in the prescribed subjects.

CHAPTER 2

BOARDS OF EXAMINATION

■ 9. BY WHOM CONVENED.—Boards of examination will be convened by AAA separate battery, separate battalion, and higher unit commanders for examination of members of their commands. Normally, such boards will be convened annually. Individuals not members of the command of the convening authority and for whom provision for examination has not otherwise been made, will be examined upon application and, if found qualified, will be announced as gunners by the authority convening the board conducting their examinations. At the discretion of those commanders authorized to convene examining boards, supplementary gunners' examinations may be held for those individuals who for any reason were not examined during the regular examination.

■ 10. COMPOSITION.—The examining board will consist of three antiaircraft artillery officers. So far as practicable, the examining board for any particular battery will be made up of officers from other batteries. In case three AAA officers are not available, application will be made to the next higher headquarters for the convening of the board.

■ 11. WHERE HELD.—The examination of gunner candidates will be held only at such places as the matériel pertaining to the subject is located.

■ 12. HOW CONDUCTED.—Examinations will be conducted by practical demonstration of the required knowledge. Written and oral examination will be held to a minimum. Examining boards will prepare in advance tests and a scoring method sufficiently detailed to insure that good practical knowledge of the subject is required for qualification. Subjects in which a practical demonstration of knowledge is required are indicated by asterisks (*) in sections II to V, chapter 3. The character of the examination must be sufficiently searching in its details to eliminate the superficially prepared candi-

date and to insure the uncovering of the candidate who, by work and study, has acquired a knowledge and proficiency which will materially increase his usefulness to the service. The examination of candidates for expert gunner will be conducted with such thoroughness as to insure that, for qualification, the candidate has a thorough practical knowledge of the subject, *and* the ability to impart that knowledge to others. Whenever, during the progress of the examination of a candidate, the sum of the marks received on subjects for which he has already been examined, increased by the maximum allowed for the remaining subjects, is less than required for qualification, he will be disqualified and his examination will be discontinued.

■ 13. RECORDS AND REPORTS.—Information on the subject of records and reports will be found in AR 345-1000.

CHAPTER 3

SCOPE OF EXAMINATION

SECTION I

GENERAL

■ 14. **GENERAL.**—The examination taken by officers, warrant officers, and enlisted men who are candidates for gunners will be that prescribed for the particular type of organization to which the candidate is assigned or attached. Upon qualifying as expert or first-class in the primary specialty, a candidate is eligible to take any or all of the other examinations. For candidates not on duty with an AAA organization, the candidate may elect to take any one of the authorized examinations.

■ 15. **CADETS OF THE UNITED STATES MILITARY ACADEMY.**—The examination to be taken by cadets of the United States Military Academy will be one of those prescribed herein, and will be selected by the cadet with the approval of the tactical officer in charge of antiaircraft artillery instruction. The same standards will apply and the examination will be conducted in a similar manner.

■ 16. **R. O. T. C.**—The examination to be taken by R. O. T. C. candidates for gunners will be one of those prescribed herein for particular organizations, and will be selected by the candidate with the approval of the senior antiaircraft artillery officer on duty with the unit. The same standards will apply, and the examination will be conducted in a similar manner.

■ 17. **C. M. T. C.**—The examination to be taken by trainees of C. M. T. C. units will be one of those prescribed herein and will be selected by the camp commander. The same standards will apply and the examination will be conducted in a similar manner.

SECTION II

AA GUNS

■ 18. SECOND-CLASS GUNNERS.

<i>a.</i> Primary weapon (including mount)-----	40
(1) Nomenclature.	
(2) Service of the piece.*	
(3) Action and care of the piece and mount.*	
(4) Emplacement and march order.*	
(5) Orientation.*	
(6) Safety precautions.	
<i>b.</i> Machine guns and mounts-----	10
(1) Nomenclature.	
(2) Service of the piece.*	
(3) Action and care of the piece and mount, to include stripping, assembling, cleaning, and action in case of stoppages.*	
(4) Emplacement and march order.*	
(5) Safety precautions.	
<i>c.</i> Small arms-----	5
(1) Nomenclature.	
(2) Care and maintenance, to include minor adjustments, action in case of stoppages, stripping, and assembling.*	
(3) Safety precautions.	
<i>d.</i> Motor transportation-----	15
(1) Nomenclature of major parts.	
(2) Practical operation of motor vehicles, to include driving, cross-country driving, and hand signals*	
(3) Care and maintenance, to include fueling, tire pressure, washing, greasing, and other first echelon maintenance.*	
(4) Motor marches and convoy discipline.	
<i>e.</i> Basic communication*-----	5
<i>f.</i> Handling, storage, and use of ammunition and fuzes*-----	5
<i>g.</i> Cordage and mechanical maneuvers*-----	5
<i>h.</i> Recognition of aircraft*-----	5
<i>i.</i> Recognition of armored vehicles*-----	5

j. Preparation of positions, including camouflage and concealment, field engineering and fortifications, and field sanitation*-----	5
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■ 19. FIRST-CLASS GUNNERS.

a. Conduct and control of fire-----	35
(1) Duties of each member of the range section.*	
(2) Methods of observing and adjusting fire.	
(3) Use and characteristic of tracers.	
b. Fire-control instruments-----	25
(1) Use, including service of the piece.*	
(2) Orientation.*	
(3) Minor adjustments.*	
c. Elementary radar theory-----	5
d. Reconnaissance and occupation of position, to include emplacement and march order*-----	5
e. Basic map and aerial photograph reading*-----	10
f. Communication-----	15
(1) Telephones.	
(a) Use and care of telephones.*	
(b) Sending, receiving, and recording messages.*	
(c) Laying wire.*	
(d) Making connections.*	
(e) Testing.*	
(f) Switchboard operation.*	
(2) Elementary radio operation.*	
g. Motor transportation-----	5
(1) Practical loading.*	
(2) Trouble shooting and minor repairs.*	

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■ 20. EXPERT GUNNERS.—The candidate will be required to pass in one of the following subjects:

a. *Duties of truckmaster.*

(1) Principles of internal combustion engines, including detailed knowledge of their care, service, repair, and operation; functioning of component units, systems, and parts; and the making of minor repairs*-----	20
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(2) Inspection and maintenance of transmission gears, differentials, cooling systems, and storage batteries; inspection, maintenance, and adjustment of clutches, brakes, spark plugs, electrical systems, carburetors, valves, governors, and steering mechanisms*-----	20
(3) Elementary principles of electricity, magnetism, and induction*-----	10
(4) Shop practices, supervision, and instruction of mechanics, to include detailed knowledge of the care and use of mechanic's tools *-----	15
(5) Loads and their proper distribution*-----	5
(6) Training of drivers*-----	10
(7) Detailed knowledge of the rules of the road, convoy regulations and discipline, speed laws and regulations, parking, and road inspections*-----	10
(8) Records and reports, motor transportation*-----	5
(9) Destruction of equipment-----	5
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NOTE.—In the case of self-propelled units, (2) above will include bogie and track assemblies.

b. Duties of gun commander and chief of section.

(1) Definitions and elementary principles for anti-aircraft artillery-----	10
(2) Gun and mount-----	20
(a) Detailed knowledge of the functioning of the several parts.*	
(b) Inspection and maintenance, to include dismounting, care, cleaning, painting, packing, and adjusting the several parts.*	
(c) Care and adjustment of fuze setters.*	
(d) Operation and care of data transmission system.*	
(e) Orientation and synchronization.*	
(3) Ability to instruct in the duties of each member of the gun section*-----	10
(a) Drill at the gun.*	
(b) Emplacement.*	
(4) Organization of a position-----	10
(a) Camouflage and camouflage discipline.*	
(b) Protection against sabotage, raids, and low-flying aircraft.*	

(c) Organization of a position for close-in defense.*	
(d) Construction of shelters.*	
(e) Field sanitation.*	
(5) Ammunition -----	5
(a) Storage and care.*	
(b) Preparing projectiles for firing.*	
(6) Preparations for service practice, to include safety precautions before and during firing -----	10
(7) Pointing and firing -----	15
(a) Methods of pointing.*	
(b) Methods of firing trial shots.*	
(c) Procedure in verification and calibration firings.*	
(d) Bore sighting and orientation.*	
(e) Adjustment of sights.*	
(f) Emergency methods of fire control.*	
(8) Map reading -----	10
(a) Scales, contours, and conventional signs.*	
(b) Location of a position by coordinates.*	
(c) Ability to follow routes indicated on a map.*	
(d) Ability to determine data as to roads, bridges, fords, grades, swamps, etc.*	
(9) March rules and discipline -----	5
(10) Destruction of equipment -----	5

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c. Duties of chief of range section.

(1) Definitions and elementary principles for antiaircraft artillery -----	5
(2) Position-finding system -----	10
(a) Detailed knowledge of the system in use in the battery.*	
(b) Emergency systems of fire control.*	
(3) Position-finding apparatus -----	20
(a) Detailed knowledge of the adjustment, care, and operation of all fire-control and position-firing apparatus in use in the battery.*	

(b) Detailed knowledge of the precautions to be taken in the loading, unloading, and transportation of fire-control and position-finding apparatus.*

(4) Ability to instruct in the duties of each member of the range section*-----	10
(5) Elementary gunnery-----	20
(a) Explanation of the several corrections necessary to obtain the final firing data.	
(b) Effect on the flight of the projectile due to non-standard conditions.	
(c) The meteorological message and how to interpret and apply it.*	
(d) Purpose of trial, verification, and calibration firings.	
(e) Computation of corrections based on trial shot firings.*	
(6) Methods of observation and how to apply corrections*-----	10
(7) Use and operation of radio*-----	5
(8) Preparation of records and reports, to include knowledge of the details of analysis of target practice*--	5
(9) Radar-----	10
(a) Types and usage.	
(b) Practical hook-ups.*	
(10) Destruction of equipment-----	5
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d. Duties of fire director operator.

(1) Definitions and elementary principles for anti-aircraft artillery-----	10
(2) Position-finding systems-----	10
(a) Detailed knowledge of the system in use in the battery.*	
(b) Emergency systems of fire control.*	
(3) Position-finding apparatus-----	20
(a) Detailed knowledge of the adjustment, care, and operation of all observation instruments and range finders in use in the battery.*	
(b) Detailed knowledge of the precautions to be taken in the loading, unloading, and transportation of fire-control and position-finding apparatus.*	
(4) Method of observation and how to apply corrections*-----	15

(5) Map reading-----	10
(a) Scales, contours, and conventional signs.*	
(b) Location of a position by coordinates.*	
(6) Duties of an assistant in the use of a transit in establishing a battery position*-----	10
(7) Organization of a position-----	10
(a) Camouflage and camouflage discipline.*	
(b) Protection against sabotage, raids, and low-flying aircraft.*	
(c) Organization of a position for close in defense.*	
(d) Construction of shelters.*	
(e) Field sanitation.*	
(8) Detailed knowledge of the recognition and identi- fication of targets, to include the sending of flash mes- sages*-----	10
(9) Destruction of equipment-----	5
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e. Duties of communication sergeant.

(1) Systems of communication, to include a thor- ough knowledge of all kinds of field telephones, switch- boards, and power and telephone lines*-----	20
(2) Elementary principles of electricity, magnetism, and induction*-----	10
(3) Visual signaling, to include panels*-----	5
(4) Installation of battery field telephone system, in- cluding utilization of natural features of the terrain and artificial means for protection and concealment of ca- bles, wires, and switchboard controls and destruction of equipment*-----	15
(5) Location of faults, tests for grounds, and short circuits*-----	10
(6) Installation and operation of message centers, to include encoding and decoding*-----	15
(7) Ability to instruct in the duties of linemen and telephone and switchboard operators under all condi- tions*-----	10
(8) Use and operation of radio, to include radio pro- cedure and typical net*-----	15
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<i>f. Duties of chief radar operator.</i>	
(1) Definitions and elementary principles for antiair- craft artillery-----	10
(2) Radar apparatus-----	35
(a) Nomenclature.	
(b) Theory of operation.	
(c) Ability to instruct in the duties of each member of the radar section.*	
(d) Classification of equipment.	
(e) Cable connections.*	
(f) Orientation and synchronization.*	
(3) Starting up and shutting down procedure for type of radar with which organization is equipped*-----	10
(4) Tactical employment of the radar section-----	25
(a) Selection and preparation of emplacements.*	
(b) Camouflage and camouflage discipline.*	
(c) Protection against sabotage, raids, and low-flying aircraft.*	
(d) Organization of a position for close-in defense.*	
(e) Field sanitation.*	
(5) Destruction of equipment-----	5
(6) Troubles and remedies*-----	10
(7) Map reading-----	5
(a) Scales, contours, and conventional signs.*	
(b) Location of position by coordinates.*	
(c) Ability to follow routes indicated on a map.*	
(d) Ability to determine data as to roads, bridges, fords, grades, swamps, etc.*	

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SECTION III

AA AUTOMATIC WEAPONS

PART I—TOWED MOUNTS

■ 21. SECOND-CLASS GUNNERS.

a. Primary weapon (including mount)-----	40
(1) Nomenclature.	
(2) Service of the piece.*	

(3) Action and care of the piece and mount, to include stripping, assembling, cleaning, and action in case of stoppages.*	
(4) Emplacement and march order.*	
(5) Orientation.*	
(6) Safety precautions.	
b. Machine guns and mounts-----	10
(1) Nomenclature.	
(2) Service of the piece.*	
(3) Action and care of the piece and mount, to include stripping, assembling, cleaning, and action in case of stoppages.*	
(4) Emplacement and march order.*	
(5) Safety precautions.	
c. Small arms-----	5
(1) Nomenclature.	
(2) Care and maintenance, to include minor adjustments, action in case of stoppages, stripping, and assembling.*	
(3) Safety precautions.	
d. Motor transportation-----	15
(1) Nomenclature of major parts.	
(2) Practical operation of motor vehicles, to include driving, cross-country driving and hand signals.*	
(3) Care and maintenance, to include fueling, tire pressure, washing, greasing, and other first echelon maintenance.*	
(4) Motor marches and convoy discipline.	
e. Basic communication*-----	5
f. Handling, storage, and use of ammunition*-----	5
g. Cordage and mechanical maneuvers*-----	5
h. Recognition of aircraft*-----	5
i. Recognition of armored vehicles*-----	5
j. Preparation of positions, including camouflage and concealment, field engineering and fortifications, and field sanitation*-----	5

■ 22. FIRST-CLASS GUNNERS.

a. Conduct and control of fire-----	30
(1) Duties of each member of the range section.*	
(2) Methods of observing and adjusting fire.*	
(3) Use and characteristics of tracers.	
b. Fire-control instruments-----	25
(1) Use, including service of the piece.*	
(2) Orientation.*	
(3) Minor adjustments.*	
c. Reconnaissance and occupation of position, to include emplacement and march order*-----	10
d. Basic map and aerial photograph reading*-----	10
e. Communication -----	15
(1) Telephones.	
(a) Use and care of telephones.*	
(b) Sending, receiving, and recording messages.*	
(c) Laying wire.*	
(d) Making connections.*	
(e) Testing.*	
(f) Switchboard operation.*	
(2) Elementary radio operation.*	
f. Motor transportation-----	10
(1) Practical loading.*	
(2) Trouble shooting and minor repairs.*	

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■ 23. EXPERT GUNNERS.—The candidate will be required to pass in one of the following subjects:

a. <i>Duties of truckmaster.</i> —See paragraph 20a.	
b. <i>Duties of communication sergeant.</i> —See paragraph 20e.	
c. <i>Duties of chief of section or platoon sergeant.</i>	
(1) Definitions and elementary principles for antiaircraft artillery-----	10
(2) Gun and mount-----	25
(a) Detailed knowledge of the functioning of the several parts.*	
(b) Emergency fire control systems.*	

(c) Ability to instruct in all phases of maintenance, packing, adjustments of gun and carriage, and replacement of parts.*

(d) Detailed knowledge of precautions to be taken in loading, unloading, and transporting guns and all equipment pertaining to them.*

(3) Ability to instruct in the duties of each member of the machine-gun squad or AW section*----- 10

(4) Selection of position and emplacement, to include orientation*----- 10

(5) Organization of a position----- 10

(a) Camouflage and camouflage discipline.*

(b) Protection against sabotage, raids, and low-flying aircraft.*

(c) Organization of a position for close-in defense.*

(d) Construction of shelters.*

(e) Field sanitation.*

(6) Preparations for service practice, to include safety precautions before and during firing----- 10

(7) Map reading----- 10

(a) Scales, contours, and conventional signs.*

(b) Location of position by coordinates.*

(c) Ability to follow routes indicated on a map.*

(d) Ability to determine data as to roads, bridges, fords, swamps, etc.*

(8) March rules and discipline----- 5

(9) Use and operation of radio*----- 5

(10) Destruction of equipment----- 5

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PART II—SELF-PROPELLED

■ 24. SECOND-CLASS GUNNERS.

a. Gun and mount----- 40

(1) Nomenclature.

(2) Service of the piece.*

(3) Action and care of the piece and mount, to include shipping, assembling, cleaning, and action in case of stoppages.*

(4) Emplacement and march order.*

(5) Safety precautions.

NOTE.—The above will include both automatic cannon (37-mm or 40-mm) and/or machine guns, depending on the type of mount.

b. Small arms (to include rifle, carbine and submachine gun) ----- 10

(1) Nomenclature.

(2) Care and maintenance, to include minor adjustments, action in case of stoppages, stripping, and assembling.*

(3) Safety precautions.

c. Motor transportation ----- 20

(1) Nomenclature of major parts.

(2) Practical operation of motor vehicles, to include driving, cross country driving, and hand signals.*

(3) Care and maintenance, to include fueling, tire pressure, washing, greasing, and other first echelon maintenance.*

(4) Motor marches and convoy discipline.

d. Basic communication* ----- 5

e. Handling, storage, and use of ammunition* ----- 5

f. Cordage and mechanical maneuvers* ----- 5

g. Recognition of aircraft* ----- 5

h. Recognition of armored vehicles* ----- 5

i. Preparation of positions, including camouflage and concealment, field engineering and fortification, and field sanitation* ----- 5

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■ 25. FIRST-CLASS GUNNERS.

a. Knowledge of sights and leads* ----- 20

b. Use and care of radio, including sending, receiving, and recording messages* ----- 20

c. Basic map and aerial photograph reading* ----- 15

d. Conduct and control of fire ----- 20

(1) Methods of observing and adjusting fire.*

(2) Characteristics and use of tracers.

e. Motor transportation ----- 25

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(1) Duties of the driver in the care, service, repair, and maintenance of motor vehicles.*

(2) Trouble shooting and minor repairs.*

(3) Convoy and march rules and discipline.

(4) Handling of vehicles under adverse conditions.*

■ 26. EXPERT GUNNERS.—The candidate will be required to pass in one of the following subjects:

a. Duties of radio sergeant.—See paragraph 35c.

b. Duties of motor sergeant.—See paragraph 20a.

c. Duties of chief of section.

(1) Definitions and elementary principles for anti-aircraft artillery ----- 10

(2) Gun and mount ----- 25

(a) Detailed knowledge of the function of the several parts.*

(b) Inspection and maintenance, to include dismounting, care, cleaning, painting, packing, and adjusting the several parts.*

(3) Ability to instruct on the duties of each member of the automatic weapons platoon or machine gun platoon or section* ----- 10

(a) Drill at the gun.*

(b) Emplacement.*

(4) Organization of a position ----- 5

(a) Camouflage and camouflage discipline.*

(b) Protection against sabotage, raids, and low-flying aircraft.*

(c) Organization of a position for close-in defense.*

(d) Construction of shelters.*

(e) Field sanitation.*

(5) Ammunition ----- 5

(a) Storage and care.*

(b) Preparing projectiles for firing.*

(6) Preparations for service practice, to include safety precautions before and during firing ----- 5

(7) Pointing and firing ----- 20

(a) Methods of pointing.

(b) Bore sighting and orientation.*

(c) Adjustment of sights.*

(8) Map reading ----- 10

(a) Scales, contours, and conventional signs.*	
(b) Location of a position by coordinates.*	
(c) Elementary navigation.*	
(d) Ability to determine data as to roads, bridges, fords, grades, swamps, etc.*	
(9) March rules and discipline-----	5
(10) Destruction of equipment-----	5
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PART III.—AIRBORNE

■ 27. SECOND-CLASS GUNNERS.

a. Primary weapon, including mount-----	40
(1) Nomenclature.	
(2) Service of the piece.*	
(3) Action and care of the piece and mount, to include stripping, assembling, cleaning, and action in case of stoppages.*	
(4) Emplacement and march order.*	
(5) Orientation.*	
(6) Safety precautions.	
b. Machine guns and mounts-----	15
(1) Nomenclature.	
(2) Service of the piece.*	
(3) Action and care of the piece and mount, to include stripping, assembling, cleaning, and action in case of stoppages.*	
(4) Emplacement and march order.*	
(5) Safety precautions.	
c. Small arms-----	10
(1) Nomenclature.	
(2) Care and maintenance, to include minor adjustments, action in case of stoppages, stripping, and assembling.*	
(3) Safety precautions.	
d. Loading and lashing*-----	5
e. Basic communication*-----	5
f. Handling, storage, and use of ammunition*-----	5
g. Cordage and mechanical maneuvers*-----	5
h. Recognition of aircraft*-----	5
i. Recognition of armored vehicles*-----	5

j. Preparation of positions, including camouflage and concealment, field engineering and fortifications, and field sanitation*-----	5
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NOTE.—For units having machine guns as the primary weapon, omit *a* above and add 25 points to *b*, 5 points each to *c*, *d*, and *g*.

■ 28. FIRST-CLASS GUNNERS.

a. Knowledge of sights and leads*-----	20
b. Use and care of radio, including sending, receiving, and recording messages*-----	10
c. Basic map and aerial photograph reading*-----	5
d. Conduct and control of fire-----	20
(1) Methods of observing and adjusting fire.*	
(2) Characteristics and use of tracers.	
e. Aircraft recognition*-----	10
f. Flight discipline-----	5
g. Jump technique*-----	5
h. Loading and lashing*-----	25
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■ 29. EXPERT GUNNERS.—The candidate will be required to pass in one of the following subjects:

a. *Duties of communications sergeant.*—See paragraph 20e.

b. *Duties of chief of section.*—See paragraph 26c.

SECTION IV

AA SEARCHLIGHTS

■ 30. SECOND-CLASS GUNNERS.

a. Searchlight, including control station and power plant-----	40
(1) Nomenclature.	
(2) Service of the piece.*	
(3) Action and care of the light, control station, and power plant.*	
(4) Emplacement and march order.*	
(5) Orientation.*	

b. Machine guns and mounts:-----	10
(1) Nomenclature.	
(2) Service of the piece.*	
(3) Action and care of the piece and mount, to include stripping, assembling, cleaning, and action in case of stoppages.*	
(4) Emplacement and march order.*	
(5) Safety precautions.	
c. Small arms-----	5
(1) Nomenclature.	
(2) Care and maintenance, to include minor adjustments, action in case of stoppages, stripping, and assembling.*	
(3) Safety precautions.	
d. Motor transportation-----	15
(1) Nomenclature of major parts.	
(2) Practical operation of motor vehicles, to include driving, cross country driving, and hand signals.*	
(3) Care and maintenance, to include fueling, tire pressure, washing, greasing, and other first echelon maintenance.*	
(4) Motor marches and convoy discipline.	
e. Basic communication*-----	5
f. Handling, storage, and use of ammunition*-----	5
g. Cordage and mechanical maneuvers*-----	5
h. Recognition of aircraft*-----	5
i. Recognition of armored vehicles*-----	5
j. Preparation of positions, including camouflage and concealment, field engineering and fortifications, and field sanitation*-----	5
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	100

■ 31. FIRST-CLASS GUNNERS.

a. Theory and use of radar*-----	25
b. Reconnaissance and occupation of position, to include emplacement and march order*-----	20
c. Basic map and aerial photograph reading*-----	15
d. Communications-----	30
(1) Telephones.	
(a) Use and care of telephones.*	

(b) Sending, receiving, and recording messages.*

(c) Laying wire.*

(d) Making connections.*

(e) Testing.*

(f) Switchboard operation.*

(2) Radio.

(a) Elementary radio operation.*

(b) Radio procedure.*

(c) Typical radio net and operation thereof.*

e. Motor transportation----- 10

(1) Practical loading.*

(2) Trouble shooting and minor repairs.*

100

■ 32. EXPERT GUNNERS.—The candidate will be required to pass in one of the following subjects:

a. *Duties of truckmaster.*—See paragraph 20a.

b. *Duties of communication sergeant.*—See paragraph 20e.

c. *Duties of chief radar operator.*—See paragraph 20f.

d. *Duties of chief of section.*

(1) Definitions and elementary principles for anti-aircraft artillery----- 10

(2) Searchlight apparatus----- 35

(a) Detailed knowledge of the functioning of the several parts.*

(b) Inspection and maintenance, to include adjustments, care and cleaning of the several parts.*

(c) Ability to instruct in the duties of each member of the searchlight squad.*

(d) Detailed knowledge of precautions to be taken in the loading, unloading, and transportation of all searchlight equipment.*

(3) Trouble and remedies: (Practical knowledge of testing and repair of circuits, lamps, and switches, and the testing of ammeters and voltmeters.) *----- 25

(4) Tactical employment of the searchlight section_ 10

(a) Selection and preparation of light emplacements.*

(b) Camouflage and camouflage discipline.*

(c) Protection against sabotage, raids, and low-fly- ing aircraft.*	
(d) Organization of a position for close in defense.*	
(e) Field sanitation.*	
(5) Map reading	10
(a) Scales, contours, and conventional signs.*	
(b) Location of position by coordinates.*	
(c) Ability to follow routes indicated on a map.*	
(d) Ability to determine data as to roads, bridges, fords, grades, swamps, etc.*	
(6) March rules and discipline.....	5
(7) Destruction of equipment.....	5
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	100

SECTION V

AA HEADQUARTERS BATTERIES

■ 33. SECOND-CLASS GUNNERS.

a. Machine guns and mounts.....	10
(1) Nomenclature.	
(2) Service of the piece.*	
(3) Action and care of the piece and mount, to in- clude stripping, assembling, cleaning, and action in case of stoppages.*	
(4) Emplacement and march order.*	
(5) Safety precautions.	
b. Small arms.....	10
(1) Nomenclature.	
(2) Care and maintenance, to include minor adjust- ments, action in case of stoppages, stripping, and as- sembling.*	
(3) Safety precautions.	
c. Motor transportation.....	15
(1) Nomenclature of major parts.	
(2) Practical operation of motor vehicles, to include driving, cross-country driving, and hand signals.*	
(3) Care and maintenance, to include fueling, tire pressure, washing, greasing, and other first echelon maintenance.*	

(4) Motor marches and convoy discipline.	
<i>d.</i> Basic communication*-----	15
<i>e.</i> Handling, storage, and use of ammunition*-----	15
<i>f.</i> General duties of an operations section*-----	10
<i>g.</i> General duties of a personnel section *-----	5
<i>h.</i> Cordage and mechanical maneuvers*-----	5
<i>i.</i> Recognition of aircraft*-----	5
<i>j.</i> Recognition of armored vehicles*-----	5
<i>k.</i> Preparation of positions, including camouflage and concealment, field engineering and fortifications, and field sanitation*-----	5
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NOTE.—In the case of headquarters battery searchlight battalions, omit *e* above, and add 5 points each to *b*, *d*, and *f*.

■ 34. FIRST-CLASS GUNNERS.

<i>a.</i> Reconnaissance and occupation of position*-----	10
<i>b.</i> Elementary definitions for antiaircraft artillery----	5
<i>c.</i> Communication -----	20
(1) Telephones.	
(a) Use and care of telephones.*	
(b) Sending, receiving, and recording messages.*	
(c) Laying wire.*	
(d) Making connections.*	
(e) Testing.*	
(f) Switchboard operation.*	
(2) Radio.	
(a) Elementary radio operation.*	
(b) Radio procedure.*	
(c) Typical radio net and operation thereof.*	
<i>d.</i> Command post procedure*-----	5
<i>e.</i> Motor transportation-----	15
(1) Practical loading.*	
(2) Trouble shooting and minor repairs.*	
<i>f.</i> Instruments-----	10
(1) Use.*	
(2) Adjustments.*	
<i>g.</i> Detailed knowledge of procuring, handling, and storage of ammunition under all conditions of service,	

to include capacities, precautions in handling, and action in case of accident or emergency*-----	10
h. Supplies -----	10
(1) Procurement and distribution.	
(2) Handling and storage.	
i. Map reading-----	15
(1) Scales, contours, and conventional signs.*	
(2) Location of position by coordinates.*	
(3) Ability to follow routes indicated on a map.*	
(4) Ability to determine data as to roads, bridges, fords, grades, swamps, etc.*	

100

NOTE 1.—In the case of headquarters battery of searchlight battalions, omit *g* above and add 5 points each to *a* and *c*.

NOTE 2.—In the case of headquarters battery of automatic weapons battalions, omit *f* above, and add 5 points each to *a* and *c*.

■ 35. EXPERT GUNNERS.—The candidate will be required to pass in one of the following subjects.

a. *Duties of truckmaster*.—See paragraph 20a.

b. *Duties of communication sergeant*.—See paragraph 20e.

c. *Duties of radio sergeant*.

(1) Proficiency in the use of code*-----	10
(2) Typical radio net and operation thereof*-----	15
(3) Care and maintenance of equipment*-----	10
(4) Testing and repair *-----	20
(5) Radio theory-----	15
(6) Encoding and decoding*-----	5
(7) Care of generator*-----	10
(8) Radio procedure*-----	5
(a) Voice.	
(b) C. W.	
(9) Nomenclature-----	5
(10) Destruction of equipment-----	5

100

d. *Duties of operations sergeant*.

(1) Knowledge of tactical operations-----	20
(2) Use and maintenance of situation maps*-----	15

(3) Organization and maintenance of CP*-----	15
(4) Map reading*-----	15
(5) Methods of communication*-----	5
(6) Methods of training, training programs and schedules, and progress charts*-----	10
(7) Destruction of equipment and papers-----	5
(8) Journals*-----	5
(9) Drafting*-----	5
(10) Scouting and patrolling*-----	5
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e. Duties of ammunition sergeant.

(1) Procurement, handling, and storage of ammunition under all conditions of service, to include capacities, precautions in handling, and action in case of accident or emergency*-----	20
(2) Choice of position for ammunition dump*-----	10
(3) Construction details of bombproof dump*-----	20
(4) Methods of destruction for each type of ammunition-----	15
(5) Belting and clipping procedure*-----	10
(6) Motor transportation*-----	10
(7) Map reading*-----	15
	<hr/> 100

f. Duties of intelligence sergeant.

(1) Knowledge of tactical operations*-----	20
(2) Use and maintenance of situation map*-----	15
(3) Organization and maintenance of CP*-----	5
(4) Map reading*-----	15
(5) Methods of communication*-----	5
(6) Methods of training, training programs and schedules, and progress charts*-----	5
(7) Journals*-----	5
(8) Scouting and patrolling*-----	20
(9) Drafting*-----	5
(10) Destruction of equipment and papers-----	5
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